

WHAT IS CLAIMED IS:

1. A mobile client terminal for maintaining transaction cache consistency in a mobile communication network, the mobile client terminal in communication with a mobile server configured to periodically broadcast an invalidation report (IR) message, wherein the mobile client terminal updates data stored in a transaction cache based upon information included in the IR message, and confirms execution of a transaction.
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2. The mobile client terminal of claim 1, comprising:
10 a transaction execution module for executing the transaction;
 a cache invalidation module for updating the transaction cache based on the information included in the IR message;
 a cache consistency module for maintaining transaction cache consistency by canceling transactions which are invalid according to the
15 information included in the IR message; and
 a confirmation module for confirming or delaying execution of the transaction, depending on a time stamp of data accessed by the transaction execution module.
3. The mobile client terminal of claim 1, wherein the mobile server
20 comprises:
 an IR module for periodically broadcasting the IR message; and
 a data set providing module for providing data to the mobile client terminal in response to an immediate caching request from the mobile client.
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4. The mobile client terminal of claim 1, wherein the IR message comprises:

- a broadcast time stamp for indicating a broadcast time;
 - updated data; and
- 5 an update time stamp of a transaction confirming the updated data.

5. The mobile client terminal of claim 1, wherein at least one data is associated with the transaction, the data having a time stamp, wherein:

- if the data associated with the transaction has a time stamp identical to
10 time stamps of other data associated with the transaction, the mobile client terminal immediately confirms the transaction; and
- if the data associated with the transaction does not have a time stamp identical to time stamps of other data associated with the transaction, the mobile client terminal defers confirming the transaction until another IR message received
15 by the mobile client.

6. The mobile client terminal of claim 1, wherein data stored in the transaction cache is associated with a cache time stamp, and wherein if execution of the transaction updates the data, the mobile server updates the cache time
20 stamp.

7. A method for maintaining transaction cache consistency for a mobile terminal in a mobile communication environment, comprising the steps of:
executing a read-only transaction that requests data;
25 updating data stored in a cache of the mobile terminal in response to

receiving an invalidation report (IR) message; and

confirming the executed read-only transaction.

8. The method of claim 7, wherein the IR message is periodically
5 broadcast by a mobile server, wherein the IR message comprises:

a broadcast time stamp;

updated data; and

an update time stamp associated with the updated data.

- 10 9. The method of claim 8, wherein the update time stamp indicates
when the updated data was last confirmed.

10. The method of claim 7, wherein the step of updating data stored in
the cache comprises:

- 15 deleting data stored in the cache, if the IR message is not received within
a broadcast period;

- comparing an update time stamp of data received in the IR message with
a cache time stamp of corresponding data stored in the cache, if the data received
in the IR message is already stored in the cache and the IR message is received
20 within the broadcast period; and

- replacing data stored in the cache with the data received in the IR
message and associating with the data received in the IR message a cache time
stamp equal to a broadcast time stamp of the IR message, if the update time
stamp of the data received is after the cache time stamp of corresponding data
25 stored in the cache.

11. The method of claim 7, further comprising preventing execution of the read-only transaction associated with data invalidated in accordance with the IR message.

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12. The method of claim 7, wherein the step of confirming comprises:
determining whether all data requested by the read-only transaction have equal cache time stamps,

immediately confirming the read-only transaction, if all data have equal
10 cache time stamps; and

delaying confirmation of the read-only transaction until a second IR message is received, if all data do not have equal cache time stamps.

13. The method of claim 7, further comprising:
15 confirming the read-only transaction, if the read-only transaction does not include data invalidated based on the IR message; and
canceling the read-only transaction, if the read-only transaction includes
data invalidated based on the IR message.

20 14. A method for updating transaction cache consistency in a mobile communication environment, the method comprising the steps of:

periodically broadcasting an invalidation report (IR) message from a mobile server to a mobile client; and

executing a read-only transaction, comprising a request for data, by using
25 an optimistic concurrency control with timestamp span (OCC-UTS²) protocol.

15. The method of claim 14, wherein the step of executing the read-only transaction comprises:

determining whether requested data is stored in a transaction cache;
5 processing the requested data in the transaction cache, if the requested data is stored in the cache; and
retrieving the requested data from a mobile server, if the requested data is not stored in the transaction cache.

10 16. The method of claim 15, wherein the requested data stored in the transaction cache is associated with a cache time stamp, the method further comprising:

receiving an IR message associated with the requested data, wherein the IR message includes corresponding data associated with an update time stamp;
15 selecting the requested data stored in the transaction cache, if the update time stamp matches the cache time stamp; and
waiting to receive another IR message, if the update time stamp does not match the cache time stamp.

20 17. The method of claim 16, further comprising:

replacing data stored in the transaction cache with the corresponding data in the IR message, if the corresponding data included in the IR message is associated with an update time stamp that is after the cache time stamp associated with the data stored in the cache.

18. The method of claim 14, further comprising:
confirming the read-only transaction immediately, if all data requested by
the executed read-only transaction have same cache time stamps; and
delaying confirming the read-only transaction until another IR message is
5 received, if all data requested by the executed read-only transaction do not have
the same cache time stamps.
19. The method of claim 16, further comprising:
confirming a read-only transaction, if the read-only transaction does not
10 request invalidated data, according to a received IR message; and
canceling a read-only transaction, if the read-only transaction requests
invalidated data, according to a received IR message.
20. The method of claim 16, further comprising updating the
15 transaction cache when an IR message is received.
21. A mobile communication network comprising mobile server and
mobile client terminals in communication with each other in at least one cell of the
mobile communication network, wherein each mobile client terminal comprises a
20 transaction cache, and wherein the transaction cache comprises data associated
with a cache time stamp, the mobile client terminal comprising logic code
embedded in a recording medium for execution by a microcontroller, wherein the
execution of the logic code causes the microcontroller to perform:
receiving a request for data to be used in a transaction;
25 determining whether the data is stored in the transaction cache;

using the data if the data is stored in the transaction cache to execute the transaction, wherein the data stored in the transaction cache is associated with a cache time stamp;

- 5 retrieving the data from the mobile server, if the data is not stored in the transaction cache, and storing the data in the transaction cache in association with a corresponding cache time stamp;

determining if an invalidation report (IR) message includes validation information associated with the data, the validation information including an update time stamp associated with the data;

- 10 validating the data as stored in the cache, if the update time stamp is before the cache time stamp; and

updating the requested data, if the update time stamp is after the cache time stamp.